

REASON TWO

Brilliant Education: Options for Higher Learning Abound

By Larry Warren



HIGH SCHOOL STUDENTS take on the role of CSI sleuths as they navigate through a crime scene during a summer science camp. College students figure out how to get a lawn mower started in cold weather, while others produce an animated film that wins a student Emmy award. Still, others team with a world-renowned researcher to figure out how to squeeze energy from pond scum.

In high schools and universities across Utah, tomorrow's workforce is getting an education preparing them both with practical knowledge, and just as importantly, the skills to think critically—to imagine and create.

"We have a very entrepreneurial culture in Utah," observes Jack Brittain, the University of Utah's vice-president of Technology Venture Development and dean of the Business School. "There's an environment here where students can take forward ideas as simple as a popsicle or as sophisticated as medical testing equipment."

At the state's major research campuses—the University of Utah, Utah State University and Brigham Young University—and other colleges and applied technology centers, countless programs are firing imaginations and providing the skills to make the imagined real.

"Really great technologies are coming out of our universities," says Jason Perry, Executive Director for the Governor's Office of Economic Development (GOED). "And companies are indicating to us that our students are coming out ready to work without being re-educated."

LAYING THE FOUNDATION

The essential starting point for any institution of higher learning is a solid high school graduating class. The Utah Board of Education has increased the intensity of the curriculum in math and science, while stepping up recruitment of teachers in those areas. Students who are in the eighth grade today will be required to fulfill three years of math and science to graduate.

"Kids are learning at an accelerated pace," says former Utah State Science Advisor Dr. Greg Jones. "All the way through public education, we have very strong programs. We're getting graduates who are very well prepared to move into the workforce or move on to advanced education in prestigious programs."

A number of innovative programs are encouraging kids early on to find excitement in the key areas of science, technology, engineering and math. At the state level, the state science advisor's office runs Applied Science, Technology and Engineering camps, in which participation has tripled in the past three years. "Every scientist will tell you the fun of science is sitting around with your pals and figuring things out—and that's what these camps are all about," he says.

Another program takes the thrill of scientific learning to another level. Six years ago Utah educators focused on stimulating interest in career paths in science and industry started a biotechnology program for high school juniors. But no pro-

gram existed in their senior year to keep the interest alive. That's when educators joined with the students to develop InnovaBio, a non-profit company funded by a grant from the National Science Foundation.

Using school-based lab equipment, InnovaBio contracts for basic lab work from established private and government entities. "We have seven contacts currently," reports former InnovaBio director Tami Goetz of Salt Lake Community College. "Before InnovaBio, if you'd asked these kids if they'd have full-time jobs in biotech, none would have thought so. But many students have already gotten biotech jobs because of that senior year of lab work. I think Utah is doing high school biotech better than any other state in the country."

UTAH'S MAJOR UNIVERSITIES ARE LEADING THE WAY

Students attending Utah's major universities are finding no shortage of fresh thinking and new ideas in the faculties at Utah State University, Brigham Young University, and the



University of Utah. The work being done by students and their professors is leading to revolutionary technologies, patents, formation of new companies, and promising new areas of research. And students take from their experience the ability to visualize an idea and logically work it through to a practical conclusion.

"In 2006 we launched 20 companies out of the University, and we're on pace to launch another 20 in 2007," says Brittain of the University of Utah. "The only other university to launch that many is M.I.T." In terms of the revenue coming back to the University in royalties from commercialized research, the U of U ranks between the University of Michigan and Johns Hopkins University. "And we've improved our results substantially," Brittain adds. "We're headed toward the top ten."

The number of spinouts is secondary to the bottom line impact. Students are applying their technical and business knowledge in real world settings, and most importantly, learning how to set themselves on a

course of lifetime knowledge acquisition.

Take, for example, Professor Brent Strong, who holds the Loren Farr Professorship in Entrepreneurship in the Brigham Young University School of Technology. "The most important thing you can teach a student today is not knowledge—but how to learn," he says. Strong estimates that half the knowledge a professor can teach will become obsolete within 10 years. So when Strong teaches a class in manufacturing that's open to students in all majors, he really teaches a history of creativity class. "We look at societies and ask 'why were they creative?' And by logical extension, how can we foster that creativity here today?"

At BYU, which is mainly an undergraduate teaching school, although its research budget tops \$30 million, most students have what BYU spokesman Michael Smart describes as a "capstone" experience. "In their senior year, students work with industry on projects in a partnership/mentorship experience." This year, one team of engineering students is working with John Deere to come up with a cold weather starting lawn mower. Another student team is redesigning an elevator to automate it with voice recognition. Advertising students are developing an ad campaign for a major video game company, and animation students have knocked out their fourth student Emmy award in a row with the animated short "Las Piñatas."

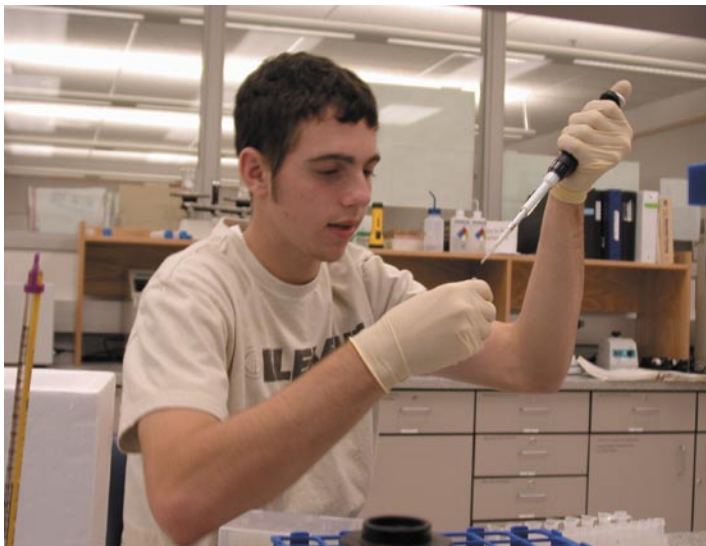


Although BYU's research dollars are relatively small, it ranks first in the nation in the number of startup companies spun out per million dollars of research and fifth in licensing income per million dollars of research.

Another asset at the school is the language expertise of the student body. In an increasingly global economy, language ability can be a major advantage. Many of its students enter after completing two-year missions for the the Church of Jesus Christ of Latter-day Saints worldwide. "Our student body comes from all 50 states and 120 countries. More than three quarters of the student body speaks a foreign language." As a result, Smart observes, "We're able to teach 66 languages here."

At Utah State University, \$150 million annually is spent on research. The university's strengths include aerospace technology, engineering, agriculture and personalized medicine through the burgeoning field of food sciences and their impact on health.

USU's vice-president for strategic venture and economic develop-



APPLIED SCIENCE CAMP

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FORMER DIRECTOR, INNOVABIO

ment, Ned Weinshenker, comes from an organic chemistry background and leadership positions at major pharmaceutical companies. He says USU's future is bright, especially in relation to commercial technology research applications, like USU's world renowned Space Dynamics Laboratory, and its expertise in personalized medicine, including its Alzheimer's disease research. "We are making connections with industries," Weinshenker points out. "We're turning out lots of engineers—mechanical, electrical, civil, and computer engineers. And we're turning out a lot of graduates in food science. We're creating the Center for Advanced Nutrition, doing diabetes and obesity research."

Performing research that can become commercialized for the benefit of mankind is a key mission of USU today, and Weinshenker's appointment is a key part of the picture according to USU President Stan Albrecht. "(His appointment) demonstrates USU's strong commitment as a leading research institution in the country in developing intellectual discoveries and turning them into commercial ventures. It is Utah's economy that will reap the benefits."

USTAR AND THE NEXT LEVEL

The Utah Legislature is enthusiastically behind Utah's push for excellence in higher education and is making a major investment to take the work of Utah's research campuses to the next level.

The Utah Science, Technology and Research initiative—USTAR—funded by a \$200 million state appropriation, is luring top research teams from around the nation to relocate at the University of Utah and Utah State University. The research they provide can be used by existing Utah companies and spun off into new private ventures, populated by USTAR graduates.

"The key part of USTAR is economic development through bringing in world class researchers to the universities—bringing in people who can work across boundaries and disciplines," explains Dinish Patel, a USTAR board member and a found-

ing father of the Mountain West's biotechnology and pharmaceutical industries.

"The first thing we did was an analysis of where we are already considered among the best in the world," Patel says. "If you're a leader in that space, then you can bring in a superstar." As an example, Patel points to the University of Utah's recruitment of Guido Gerig. The University competed with Harvard and other top schools to get Gerig to relocate from the University of North Carolina at Chapel Hill. His research has already led to the creation of spin off companies which make imaging software to diagnose diseases of the brain.

Gerig chose Utah because its groundbreaking imaging research program complemented his work. "And he has already attracted other world class researchers," Patel says.

Utah has clusters of technological excellence in fields as diverse as aerospace, food science, fossil fuels, biomedical devices, and composite materials, and USTAR recruiters are luring top researchers in every field identified as a Utah strength.

At Utah State University, USTAR funding created the Center for Advanced Nutrition, conducting cutting-edge research on Alzheimer's disease and obesity.

"We have a cluster of nutritional supplement companies in this state," explains Weinshenker. "We're making connections between companies and the University. That's a selling point in bringing top researchers in."

With the USTAR initiative, USU has lured David York, a leading obesity researcher formerly with the Pennington Biomedical Research Center in Baton Rouge, La. York studies the mechanics that control food intake and nutrient selection.

When Utah lawmakers reviewed results of their initial round of USTAR funding, they got enthusiastic thumbs up from USU sophomore biology student Andrew Burgon. He is helping to work on a weight loss drug, which is part of York's obesity research. "It's like being a kid who wants to direct movies getting to work with Stephen Spielberg," Burgon told lawmakers of his association with York.

Other USU/USTAR faculty members are making similar impacts in attracting research dollars, tackling projects with commercial potential, and inspiring the students who will carry the research into the future. For example, one USTAR faculty member at USU, Dr. Krishna Shenai, is an expert in energy conditioning. "His work in wireless sensors and power conditioning—getting more power out of a generator, changing the voltage and smoothing it out—has wide application," Weinshenker reports.

At the University of Utah, the first USTAR faculty members are creating a similar impact. Cameron Charles' research focuses on high-speed wireless communications systems, which work with applications in Utah's defense, homeland security, and other industries such as home automation.

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Jack Brittain

VICE-PRESIDENT OF TECHNOLOGY VENTURE DEVELOPMENT AND DEAN, ECCLES SCHOOL OF BUSINESS, UNIVERSITY OF UTAH



USTAR FIELD-SITE TEST TO STORE CARBON UNDERGROUND IN SOUTHERN UTAH.

The University of Utah also has a strong cluster of expertise in fossil fuels on which USTAR faculty member Brian McPherson has brought his research expertise to bear. His work on storage methods for carbon dioxide may ultimately help reduce greenhouse gases and enhance oil recovery in some of Utah's aging oil fields.

USTAR recruiters continue to identify and recruit more faculty members to further the ambitious USTAR mission. It is just the latest piece in the forward-looking ambitions of Utah's

colleges and universities.

It all makes perfect sense, observes U of U Business School Dean Jack Brittain. The investments of intellectual and monetary capital mean "companies that successfully commercialize our technologies, hire our graduates, and put their research dollars back into the university, will eventually become donors," he says.

"In Utah higher education, that's the formula for success, both for the universities and those who partner with them," Brittain says.